Abstract

An optical detection system is adapted particularly for detection of biological reactions, especially fluorescent or chemilluminescent reactions. An excitation source, preferably a laser, illuminates a portion of an object to be examined, the portion preferably comprising one microlocation out of an array of microlocations. An intervening optical detection platform serves to direct the excitation radiation, preferably through use of a scanning system, most preferably through use of an x-y mirror-based scanning system to the portion of the object to be illuminated. A detector, preferably a photomultiplier tube, receives the emitted radiation from the objects to be examined, the detector being characterized in that the diameter of the region examined by the detector is the same as or smaller than the diameter of the illuminated region, and comprises less than the entire surface of the object to be examined, and most preferably images a whole or a part of a single microlocation. Preferably, the excitation source is coupled to the optical detection platform via an optical fiber. In operation, a confocal microscopy system is formed in which the excitation radiation is substantially in focus at the surface of the object to be examined, the excitation radiation having a lateral extent less than the entire diameter of the object to be examined and the detection system having a lateral field of view of a diameter substantially the same as or less than the diameter of the excitation region. In one aspect of this invention, the optical detection platform includes an excitation detector which measures reflected excitation radiation from the object to be examined. This information is then compared to prestored information regarding the location of the microlocations and interstitial regions on the object to be examined, whereby alignment information is obtained. The excitation radiation may then be precisely directed to a given microlocation or portion thereof so as to perform the examining through the confocal system. Significant increases in signal-to-noise ratio are achieve.

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